



**US Army Corps  
of Engineers®**  
North Pacific Division

# Columbia River Update

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The Columbia River is the dominant water system in the Pacific Northwest. Federal operators charged with managing flows, fisheries and power production of the Columbia-Snake river system consider numerous factors in making decisions that best serve the needs of the region. Unusually high flows expected throughout the system this year may have significant impacts on mainstem Columbia and Snake river operations. This periodic report will address how the current hydrologic situation may affect reservoir operations in the Columbia Basin.

## Current Situation

### Seasonal Volume Forecast

Snowpack is the amount of water stored in the snow available for runoff in the spring and summer. It does not reflect additional rainfall which could occur during the runoff season. Snowpack across the Columbia Basin currently ranges from highs of more than 220% of normal in south central Idaho to 128% in the Willamette Basin.

At three key flood control points in the Columbia/Snake river system, the April through August runoff volume forecasts show 126% of normal volume at Grand Coulee Dam; 158% at Lower Granite Dam and 135% at The Dalles Dam. Forecasts are updated periodically.

The Dalles forecast of 135% of normal equals about 125 million acre feet of volume. That's about the same volume present just prior to the Flood of 1948, but less than the volume seen in 1974, the last springtime flood event on the Columbia system.

### Anticipated Flows

The February 1997 Final Water Supply Forecast is one of the largest in the past 60 years. Hydrologists say the wild card in predicting actual flows is the timing of the seasonal runoff, primarily determined by air temperature and

precipitation.

Peak flows along the Columbia and Snake rivers this spring and summer are predicted to exceed those of last year. The River Forecast Center expects flows at The Dalles (the index point for Portland/Vancouver harbor) to range from 475,000 to 555,000 cubic feet per second (cfs); however, the peak could be higher or lower. High flows at Lower Granite Dam on the Snake River could range from 220,000 to 320,000 cfs this spring. Flows of 500,000 cfs past Bonneville translate to about a 22' river stage at Vancouver harbor where flood stage is 16 feet and major flood stage is 26 feet.

To provide flood control storage space for spring runoff, most Columbia Basin reservoirs are being drafted to minimum flood control pool levels. System reservoirs can hold only 30 million acre feet of water - the rest is passed through the dams and powerhouses or over the spillways. More than 107 million acre feet of water is expected to pass through The Dalles Dam between May and August.

Corps dams in the Columbia River system account for about 6.5 million acre feet of storage with Dworshak Dam's capacity at 2 million, Libby Dam at 4 million, and John Day Dam at 0.5 million acre feet of storage. The remaining 23.5 million acre feet of storage is found at the Bureau of Reclamation's Grand Coulee and Hungry Horse dams; Idaho Power's Brownlee Dam; and BC Hydro's dams on the upper Columbia in Canada.

### Unit availability

Ice Harbor Unit 5 is out of service and cannot be repaired prior to the 1997 fish migration season. Other planned repairs will keep two units at Bonneville, one at The Dalles, and one at John Day out of commission all season. All 14 units at McNary are scheduled to be in service by the end of March. Outages for routine maintenance are scheduled to avoid the fish window and high flow periods.

## **Scheduled Nav Lock Maintenance**

Corps locks along the 465 mile stretch of the Columbia and Snake waterway up to Lewiston, Idaho, will be closed for annual maintenance work from March 2 to 17.

## **Construction**

High flows in January 1997 interrupted spillway modifications to help control gas supersaturation at John Day and Ice Harbor. Four of eight flow deflectors, also known as flip lips, were completed at Ice Harbor Dam but high spring and summer flows may delay installation of the remainder until early next year.

At John Day Dam, four deflectors are expected to be completed by May 1. Engineers expect 18 of the 20 spillway bays to be outfitted with deflectors by the spring of 1998.

At Lower Granite Dam, modifications to the surface bypass prototype are scheduled to be completed by the first week of April with 1997 testing to begin in mid-April. At Dworshak Dam, grouting repair work will start this fall to avoid interfering with flow augmentation and fish passage.

## **Potential Impacts Of High Flows**

### **Reservoir operations**

Reservoir operation for flood control is crucial to providing protection for lives and property throughout the Basin. Reservoirs throughout the system follow established flood control guidelines, or rule curves, for the elevation of the pools behind the dams.

Based on volume of water and the forecast the rule curves - - which are dynamic during the season - - define elevations for each reservoir. At John Day Dam, the maximum pool on April 30 will be below 262.5 feet. It may drop to an elevation of 257' when unregulated flow reaches 400,000 cfs at The Dalles, depending on the shape, or timing, of the spring runoff.

At Lower Granite, there will be a draw-down of eight to nine feet from normal minimum pool (with pool elevation between 724 - 725 feet) to prevent overtopping Lewiston and Clarkston levees and insure an appropriate safety margin.

## **Navigation**

Delays in navigation may be expected during times of peak flows in the lower Snake and lower Columbia rivers. The peak of the snowmelt freshet is expected to occur in late May or early June.

## **Water Supply and Irrigation**

If the John Day pool elevation drops to 257 feet to provide needed flood control storage and protect flood stages in the lower Columbia, irrigation may be affected.

## **Adult Fish Passage**

Adult fish passage facilities may be affected by high spring flows. Most of the impact will be noticeable at the entrances to the ladders which become difficult to negotiate at times of heavy and involuntary spill. This, combined with high flows, delays the journey of the fish coming upriver.

## **Juvenile Fish Passage**

Fish barging may not be possible at times of peak flows since barges cannot maneuver at extremely high flows. Collection facilities will put fish back in the river when transportation options are limited. Just as in 1996, excessive debris in the river could clog screens, raceways, pipes and other orifices.

## **Research/Prototype Studies**

Scientists expect that routine monitoring may be interrupted because of water velocity and debris in the river.

## **Dissolved Gas**

The National Marine Fisheries Service has applied for waivers to allow forebay dissolved gas levels of 115% and tailwater levels of 120% to allow spill for fish as provided in the Biological Opinion. With the high flows expected on the Columbia and Snake rivers, dissolved gas levels may exceed 130% at times. Much of that gas will come in the form of uncontrollable, or involuntary spill. The unit 5 outage at Ice Harbor will have a minimal effect on reducing dissolved gas during peak flows because of the relative proportion of flow and unit capacity.